



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,984	08/18/2005	Holger Thielert	THIELERT -4 PCT	1926
25889	7590	06/25/2008		
COLLARD & ROE, P.C. 1077 NORTHERN BOULEVARD ROSLYN, NY 11576			EXAMINER WU, IVES J	
			ART UNIT 1797	PAPER NUMBER
			MAIL DATE 06/25/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/521,984

**Applicant(s)**

THIELERT, HOLGER

**Examiner**

IVES WU

**Art Unit**

1797

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-6 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SE-08)
- Paper No(s)/Mail Date 01/20/2005
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

- (1). **Claims 1-2 and 4-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tjoa et al (US03767766), in view of Heisel et al (US05628977A).

As to method for isolating hydrogen sulfide from coke oven gas with subsequent recovery of elemental sulfur in a Claus plant, in which the hydrogen sulfide is removed from the coke oven gas by means of gas scrubbing, using an absorption liquid, the charged absorption liquid is regenerated and, in this connection, hydrogen sulfide that accumulates in concentrated form is passed to the Claus plant in **independent claim 1**, Tjoa et al (US03767766) disclose method of removing gaseous sulfides from gaseous mixtures (Title). While the process has special application to treating gases having the foregoing dilute H<sub>2</sub>S content, the process can be applied advantageously to the selective removal of H<sub>2</sub>S and like sulfides from fluids having higher concentration of these undesirable sulfides. In addition to natural gas, other suitable feed streams include industrial gas streams (such as obtained in oil refinery operations) as well as flue gases, fuel gases (ie coke oven gas) and hydrogen gas streams contaminated with sulfides (Col. 5, line 71 – Col. 6, line 5). Concentrated H<sub>2</sub>S is removed from drum 23 via overhead line 27 for appropriate disposal such as to Claus furnace or acid plant (Col. 9, line 37-40). It is well known in the art that Claus furnace is to recover the elemental sulfur. As illustrated in the following diagram which shows H<sub>2</sub>S scrubber 2, regeneration column 19, absorption solution line 3.



off via pipe 17 from Claus furnace 12 (Col. 6, line 25-34). The Claus furnace waste gas at hand in pipe 21 after cooling 19 is mixed with hotter Claus furnace waste gas from pipe 13 and fed via pipe 22 to catalytic reactor 23 (Col. 6, line 37-40). Gas stream 24 that is drawn off from catalytic reactor 23 is cooled (25) and elementary sulfur condensed by cooling 25 is drawn off via pipe 26 (Col. 6, line 45-47).

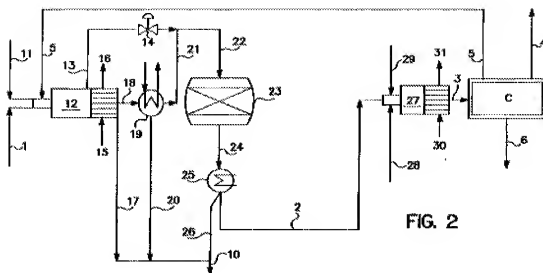


FIG. 2

U.S. Patent

May 13, 1997

Sheet 2 of 5

5,628,977

The advantage of Claus plant designed by Heisel et al is to improve the environmental compatibility of entire plant at very high sulfur recovery rates and also especially to reduce the other emissions and accumulating residues, in addition to the sulfur emissions (Col. 2, line 36-41).

Therefore, it would have been obvious at time of the invention to install the Claus plant of Heisel et al as downstream processing of the  $H_2S$  recovery plant of Tjoa et al in order to attain the advantages cited above.

As to the Claus plant being operated with only a single reaction oven, and that a working temperature of less than  $250^\circ C$  is set in this oven in the method in **independent claim 1**, the reaction oven to be operated in a temperature range between  $200^\circ C$  and  $230^\circ C$  in **claim 2**, as

Art Unit: 1797

shown in the Figure above, Heisel et al (US05628977A) disclose a single catalytic reactor 23. Advantageously, the 1st catalytic reactor is run with a starting temperature of 170 to 220 °C (Col. 5, line 9-10). This starting temperature of catalytic reactor 23 is between 1 to 10 °C., preferably between 3 to 5 °C higher than the temperature of gas stream in pipe 21 (Col. 6, line 42-45).

As to the process gas that leaves the reaction oven, after precipitation of the condensed sulfur, being passed back into the coke oven gas to be cleaned, ahead of gas scrubbing, with a residual content of hydrogen sulfide that was not converted in the reaction oven in the method in **independent claim 1**, Heisel et al (US05628977A) disclose the afterburning for the process gas leaving the reaction oven, after precipitation of condensed sulfur. Heisel et al **do not teach** passing the process gas back into the coke oven gas stream ahead of gas scrubbing as claimed.

However, it would have been obvious to replace the afterburning process by the H<sub>2</sub>S recovery plant of Tjoa et al to recycle the process gas stream exited from reaction oven, after precipitation of sulfur to the H<sub>2</sub>S recovery plant of Tjoa et al because it would use the same facility which is already integrated with Claus plant for the recovery of sulfur and save the cost of additional expansion such as afterburning plant.

As to waste heat boiler having 1<sup>st</sup> tube bundle composed of heat exchanger tubes, through which the process gas that exits from the Claus boiler flows, that the waste heat boiler has a second tube bundle composed of heat exchanger tubes, through which the process gas that exits from the reaction oven flows, and that the tube bundles are disposed in a common steam generator chamber, in which low-tension steam is generated in **claim 4**, Heisel et al (US05628977A) disclose cooling by evaporation of feed-water 15 to steam 16 for process gas from Claus furnace and cooler 25 for the process gas from catalytic reactor 23 shown in Figure 2 above. It is well known in the art that condenser has design of heat exchanger tubes in the art. Heisel et al do not disclose the two condensers 25 and one with Claus furnace to be in common steam generator chamber, it would be obvious to have them together in one chamber as well as separated in two units because rearrangement of parts renders obviousness. *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

As to elemental sulfur being drawn off from waste heat boiler in liquid form in **claim 5**, Heisel et al (US05628977A) disclose condenser used to condense the sulfur in the gas streams, therefore, the sulfur is condensed to liquid form from gas form – condensation.

Art Unit: 1797

As to a partial stream being branched out of the hot process gas that leaves the Claus boiler and mixed into the process stream that is passed to the reaction oven to heat it in **claim 6**, Heisel et al (US05628977) disclose, a part of the Claus reactor waste gas is limited quantitatively by control valve 14 on pipe 13, drawn off hot from Claus furnace, while the residual Claus reactor waste gas is cooled by evaporation of boiler feed-water 15 and drawn off via pipe 18. The steam generated by evaporation of boiler feed-water accumulates in pipe 16. With the cooling of condensed elementary sulfur, it is drawn off via pipe 17 from Claus furnace 12 (Col. 6, line 25-34). The Claus furnace waste gas at hand in pipe 21 after cooling 19 is mixed with hotter Claus furnace waste gas from pipe 13 and fed via pipe 22 to catalytic reactor 23. Control valve 14 is adjusted in this case in such a way that the gas stream in pipe 22 has a temperature of 170 °C to 220 °C (Col. 6, line 37-42).

#### *Allowable Subject Matter*

(2). **Claim 3** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu

Art Unit: 1797

Date: June 18, 2008

/Duane S. Smith/

Supervisory Patent Examiner, Art Unit 1797

6-18-08